



National Transportation Safety Board Aviation Accident Final Report

Location:	Woodruff, WI	Accident Number:	CHI06LA058
Date & Time:	01/05/2006, 0800 CST	Registration:	N391QS
Aircraft:	Cessna 560	Aircraft Damage:	Substantial
Defining Event:		Injuries:	7 None
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled		

Analysis

The airplane, on a non-scheduled domestic passenger flight, sustained substantial damage when the right wing contacted runway 36 during landing. The airplane subsequently departed the runway and impacted a snow bank. The operator stated, "The briefed REF [airspeed at the 50-foot point with flaps in the landing position and landing gear extended] speed was 101 knots. Due to weather conditions the Captain flew the approach at 110 knots. The crew encountered light rime icing descending through 4,500 feet until the time they broke out visually at approximately 2,600 feet. The crew utilized the aircraft boots 3 times on the approach to ensure the aircraft was free of contamination. The crew descended on the PAPI [precision approach path indicator] for runway 36 after breaking out visually. At approximately 55 feet the Captain brought the power levers to idle as normal. All seemed normal until approximately 20 to 30 feet when the aircraft felt as if it lost lift and the right wing dropped. The Captain added power and it took both hands to level the wings. The aircraft impacted the runway with the right wingtip hitting first. The aircraft then bounced back in the air and turned slightly to the right. The aircraft then once again settled to the surface off the right side of the runway." The airplane impacted a runway light. The Captain stated that the stick shaker came on and that he added engine power during the landing. The first officer stated that the airplane's airspeed dropped to REF -4 to -5 knots when the airplane was about 20 feet above ground level. The recorded wind was 350 degrees at 14 gusting to 21 knots. A caution in the airplane's operating manual stated, "IN ICING CONDITIONS, A SMALL AMOUNT OF RESIDUAL ICE WILL FORM ON UNPROTECTED AREAS. THIS IS NORMAL, BUT CAN CAUSE AN INCREASE IN STALL SPEEDS. WHEN ANY AMOUNT OF RESIDUAL ICE IS VISIBLE, THE STALL SPEEDS IN FIGURE 4-7 OF THE AIRPLANE FLIGHT MANUAL INCREASE BY 5 KNOTS. THE VREF/VAPP SPEEDS, LANDING DISTANCES AND THE MAXIMUM LANDING WEIGHT PERMITTED BY BRAKE ENERGY MUST BE CORRECTED IN ACCORDANCE WITH FIGURE 4-32 OF THE AIRPLANE FLIGHT MANUAL."

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:
The Captain's failure to maintain adequate airspeed during the landing which resulted in a stall/mush. Factors were the gusty conditions, the snowbank in the safety area next to the runway, and the runway light that the airplane struck.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT

Phase of Operation: LANDING

Findings

1. (F) WEATHER CONDITION - GUSTS
2. (C) AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND
3. (C) STALL/MUSH - ENCOUNTERED - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: DESCENT - UNCONTROLLED

Findings

4. TERRAIN CONDITION - GROUND
5. TERRAIN CONDITION - RUNWAY
6. (F) TERRAIN CONDITION - SNOWBANK
7. (F) OBJECT - AIRPORT SIGN/MARKER

Factual Information

HISTORY OF FLIGHT

On January 5, 2006, about 0800 central standard time, a Cessna 560, N391QS, operated by NetJets Sales, Inc., sustained substantial damage when the right wing contacted runway 36 during a landing at the Lakeland Airport/Noble F. Lee Memorial Field (ARV), near Minocqua-Woodruff, Wisconsin. The airplane subsequently departed the runway and impacted a snow bank. The non-scheduled domestic passenger flight was operating under 14 Code of Federal Regulations Part 135. Visual meteorological conditions prevailed at the time of the accident. The flight was operating on an activated instrument flight rules flight plan. The pilot, co-pilot, and five passengers were uninjured. The flight originated from the Palwaukee Municipal Airport (PWK), near Wheeling, Illinois about 0723.

The operator's accident report, in part, stated:

N391QS departed KPWK enroute to KARV with 5 passengers on a part 135 flight. The enroute portion of the flight was without event. The crew verified the weather and landing numbers enroute. In light of a notam for the AWOS [automated surface observing system] wind readout at KARV as being unreliable the crew procured the latest weather from KRHI [Rhineland-Oneida County Airport, Rhineland, Wisconsin] enroute to validate the winds and that landing on runway 36 at KARV was suitable. The crew briefed and flew the localizer approach to runway 36 at KARV. The briefed REF speed [airspeed at the 50-foot point with flaps in the landing position and landing gear extended] was 101 knots. Due to weather conditions the Captain flew the approach at 110 knots. The crew encountered light rime icing descending through 4,500 feet until the time they broke out visually at approximately 2,600 feet. The crew utilized the aircraft boots 3 times on the approach to ensure the aircraft was free of contamination. The crew descended on the PAPI [precision approach path indicator] for runway 36 after breaking out visually. At approximately 55 feet the Captain brought the power levers to idle as normal. All seemed normal until approximately 20 to 30 feet when the aircraft felt as if it lost lift and the right wing dropped. The Captain added power and took both hands to level the wings. The aircraft impacted the runway with the right wingtip hitting first. The aircraft then bounced back in the air and turned slightly to the right. The aircraft then once again settled to the surface

off the right side of the runway.

In an interview, the Captain stated that the stick shaker came on and that he added engine power during the landing.

The first officer (FO) stated that the airplane's airspeed dropped to REF -4 to -5 knots when the airplane was about 20 feet above ground level.

DAMAGE TO AIRCRAFT

The operator reported that the airplane's "nose landing gear wheel assembly and nose landing gear strut fork separated from the aircraft. Right side nose landing gear door separated from aircraft. Damage to radome, fuselage structure aft of nose landing gear well, right wing inboard flap panel and attaching structure, right wing upper and lower surfaces, and right wing tip."

OTHER DAMAGE

The operator also reported that the airplane "struck and destroyed a runway light marker light."

PERSONNEL INFORMATION

Captain:

The captain held an airline transport pilot (ATP) certificate with an airplane multiengine land rating. He was type-rated for the Cessna 500 airplane. His last medical examination was completed on August 8, 2005, and he was issued a first-class medical certificate without limitations. The operator reported the captain as having accumulated a total flight time of 8,452 hours and 1,792 hours in the same make and model airplane. He flew 131 hours during the last 3 months, 36 hours during the previous 30 days, and 2 hours during the prior 24 hours.

First Officer:

The FO held an ATP certificate with an airplane multiengine land rating. He was type-rated for the Cessna 500 airplane. His last medical examination was completed on July 7, 2005, and he was issued a first-class medical certificate without limitations. The operator reported the FO as having a total flight time of 3,200 hours, and 72 hours in the same make and model airplane. He flew 69 hours during the last 3 months, 34 hours during the previous 30 days, and 2 hours during the prior 24 hours.

AIRCRAFT INFORMATION

N391QS was a twin engine Cessna 560, serial number 560-0429. The airplane was configured with eight seats and had a maximum gross weight of 16,300 pounds. The airplane was powered by two Pratt and Whitney Canada engines rated at 3,045 pounds of thrust each. The last approved inspection program maintenance inspection was conducted on December 3, 2005. The airplane had accumulated a total time of 6,276 hours.

The airplane's flight control was through conventional cable-operated surfaces. Trimming was provided by aileron, elevator, and rudder tabs. The airplane incorporated hydraulically operated speed brakes and trailing edge flaps.

The airplane's operating manual, in part, stated:

STALL WARNING - STICK SHAKER

Stall warning is achieved by the use of a stick shaker mounted on the forward side of the pilot's control column. An electric motor with rotating weights induces a vibration feel to the control column. The pilot is alerted to impending stall by the vibration of the control column which occurs approximately 8% to 10% above the actual stall speed. Stick shaker activation will occur before stall buffet, except in the clean configuration where they are nearly the same and either could occur first. The stick shaker is energized by inputs from the angle-of-attack system. The test switch located on the pilot's switch panel provides a means of checking the shaker prior to flight.

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Speed control on final should be precise for optimum landing performance and this is best accomplished by establishing VREF airspeed well before crossing the threshold. In gusty wind conditions, it is recommended that one half the gust factor in excess of 5 knots be added to VREF.

Approaching within approximately 50 feet of airport elevation, power should be gradually reduced to counter the acceleration induced by ground effect. Wind velocity and direction will dictate the rate at which the throttles are retarded. In very high surface headwind conditions, as an example, it may be necessary to maintain at or near approach power until close to touchdown. With a tailwind, a fairly rapid power reduction may be necessary in the final descent to landing phase for accurate speed control. In ground effect, where induced drag is reduced, leaving approach power on will cause the airplane to float to a longer touchdown than desired. Retarding the throttles gradually in the final descent will normally result in idle thrust being reached just before touchdown.

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CAUTION

IN ICING CONDITIONS, A SMALL AMOUNT OF RESIDUAL ICE WILL FORM ON UNPROTECTED AREAS. THIS IS NORMAL, BUT CAN CAUSE AN INCREASE IN STALL SPEEDS. WHEN ANY AMOUNT OF RESIDUAL ICE IS VISIBLE, THE STALL SPEEDS IN FIGURE 4-7 OF THE AIRPLANE FLIGHT MANUAL INCREASE BY 5 KNOTS. THE VREF/VAPP SPEEDS, LANDING DISTANCES AND THE MAXIMUM LANDING WEIGHT PERMITTED BY BRAKE ENERGY MUST BE CORRECTED IN ACCORDANCE WITH FIGURE 4-32 OF THE AIRPLANE FLIGHT MANUAL.

METEOROLOGICAL INFORMATION

At 0755, the recorded weather at ARV was: Wind 350 degrees at 14 gusting to 21 knots; visibility 10 statute miles; sky condition overcast 1,300 feet above ground level; temperature -3 degrees C; dew point -5 degrees C; altimeter 30.04 inches of mercury.

AIDS TO NAVIGATION

ARV has a localizer approach to runway 36. The final approach fix, identified as DOUGY, is located 6.5 distance measuring equipment (DME) miles south of ARV. The published altitude at DOUGY is at or above 3,200 feet msl. After crossing DOUGY, an aircraft can descend to the minimum descent altitude of 1,980 feet msl.

AIRPORT INFORMATION

ARV is located about three miles northwest of the town of Woodruff, Wisconsin. The airport has two intersecting runways. Runway 10/28 is a 3,062 foot by 75-foot asphalt runway. Runway 18/36 is a 5,150 foot by 100-foot asphalt runway.

FLIGHT RECORDERS

The cockpit voice recorder, a Fairchild Model A200S part number S200-0012-00 serial number 01808, was auditioned and was returned to the operator.

WRECKAGE AND IMPACT INFORMATION

The airplane came to rest upright east of runway 36 about 50 to 100 feet in a snowbank. A Federal Aviation Administration Inspector's picture showed that the airplane contacted runway 36 about 90 feet north of the approach end of the runway. An on-scene examination of the wreckage revealed no pre-impact anomalies. The captain stated that there were no mechanical malfunctions with the airplane in reference to the flight.

ADDITIONAL DATA/INFORMATION

The parties to the investigation included the FAA, NetJets Sales, Inc., and Cessna Aircraft Company.

The airplane wreckage and retained item were released to a representative of the operator.

Pilot Information

Certificate:	Airline Transport; Flight Instructor	Age:	46, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane; Helicopter	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Helicopter	Toxicology Performed:	No
Medical Certification:	Class 1 Without Waivers/Limitations	Last FAA Medical Exam:	08/01/2005
Occupational Pilot:		Last Flight Review or Equivalent:	10/01/2005
Flight Time:	8452 hours (Total, all aircraft), 1792 hours (Total, this make and model), 6000 hours (Pilot In Command, all aircraft), 131 hours (Last 90 days, all aircraft), 36 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Co-Pilot Information

Certificate:	Airline Transport	Age:	40, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):		Toxicology Performed:	No
Medical Certification:	Class 1 Without Waivers/Limitations	Last FAA Medical Exam:	07/01/2005
Occupational Pilot:		Last Flight Review or Equivalent:	07/01/2005
Flight Time:	3200 hours (Total, all aircraft), 72 hours (Total, this make and model), 1700 hours (Pilot In Command, all aircraft), 69 hours (Last 90 days, all aircraft), 34 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N391QS
Model/Series:	560	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	560-0493
Landing Gear Type:	Retractable - Tricycle	Seats:	8
Date/Type of Last Inspection:	12/01/2005, AAIP	Certified Max Gross Wt.:	16300 lbs
Time Since Last Inspection:		Engines:	2 Turbo Jet
Airframe Total Time:	6276 Hours at time of accident	Engine Manufacturer:	Pratt & Whitney Canada
ELT:	Installed, not activated	Engine Model/Series:	JT15D
Registered Owner:	NETJETS SALES INC.	Rated Power:	3045 lbs
Operator:	NETJETS SALES INC.	Operating Certificate(s) Held:	On-demand Air Taxi (135)
Operator Does Business As:	EXECUTIVE JET AVIATION INC.	Operator Designator Code:	DXTA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	ARV, 1630 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	0755 CST	Direction from Accident Site:	0°
Lowest Cloud Condition:		Visibility	10 Miles
Lowest Ceiling:	Overcast / 1300 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	14 knots / 21 knots	Turbulence Type Forecast/Actual:	/
Wind Direction:	350°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.04 inches Hg	Temperature/Dew Point:	-3° C / -5° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	CHICAGO/PROSPEC, IL (PWK)	Type of Flight Plan Filed:	IFR
Destination:	Woodruff, WI (ARV)	Type of Clearance:	IFR
Departure Time:	0723 CST	Type of Airspace:	

Airport Information

Airport:	LAKELAND/NOBLE F. LEE MEMORIAL (ARV)	Runway Surface Type:	Asphalt
Airport Elevation:	1630 ft	Runway Surface Condition:	Snow
Runway Used:	36	IFR Approach:	Localizer Only
Runway Length/Width:	5150 ft / 100 ft	VFR Approach/Landing:	Full Stop

Wreckage and Impact Information

Crew Injuries:	2 None	Aircraft Damage:	Substantial
Passenger Injuries:	5 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	7 None	Latitude, Longitude:	45.935556, -89.740278

Administrative Information

Investigator In Charge (IIC):	Edward F Malinowski	Report Date:	03/26/2007
Additional Participating Persons:	Jeffrey Anderson; Federal Aviation Administration; Milwaukee, WI Tom Moody; Cessna; Wichita, KS Michael D Orr; NetJets Aviation; Columbus, OH		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

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